

## PLANNING FOR EROSION CONTROL

Many common-sense practices will reduce a developing site's vulnerability to erosion, saving the developer, the contractors or the municipality and future occupants of the area time and money. Thus, the following considerations must be addressed in any effective erosion control plan.

### 1) Plan the development to fit the site.

After a site has been inventoried and its strengths and limitations identified, tailor the layout of the buildings, roads and utilities to the topography of the site with the following:

- Restrict construction activities to the least critical areas on the site.
- Protect and maximize existing native vegetation and natural forest floor, thereby reducing impervious areas on the site.
- Diffuse stormwater rather than concentrate it into channels.
- Align roadways following natural contours, rather than up and down steep slopes.
- Cluster buildings to minimize the amount of earth movement needed.
- Divert clean water away from the immediate construction area to reduce the threat of erosion and improve building conditions.

### 2) Minimize the area of exposed soil at one time.

The less soil that is bare and exposed to rainfall and spring snowmelt, the less erosion will occur. Take these specific steps to minimize exposed soil and to prevent erosion in those areas that must be disturbed:

- In general, plan to build large development projects in shorter phases rather than all at once.
- Preserve natural vegetation by flagging it in the field.
- Protect buffer strips of undisturbed vegetation between construction areas and environmentally vulnerable areas such as watercourses and wetlands.
- Lay down temporary mulching on any exposed soil until final grade is reached.
- Immediately seed and mulch areas ready for revegetation.

***Remember that all seeding requires mulch and some method of anchoring the mulch to protect the soil until vegetation has put out substantial good root and leaf growth.***

***Otherwise, enormous amounts of soil can wash away, often carrying new seedlings with it.***

In Maine, special measures must be taken during construction in the **late fall and winter** months. These are extremely vulnerable times, when no vegetation can grow. The real danger appears in the winter thaws and the springtime, when normal rainfall combines with snow-melt to produce vast amounts of runoff and the soil is frozen with little water percolating into it. Spring runoff can be devastating to an open construction site, and repair costs will often be greater than erosion prevention measures. An erosion control plan should be prepared specifically for this season (September 15th through April 15th); with additional upgraded measures used. See the WINTER CONSTRUCTION BMP.

### 3) Provide channel stability in both natural and man-made waterways.

One of the first orders of business on a development site is to build roads with ditches to drain them. Because the asphalt roadway no longer allows water to seep into the ground, a greater volume of water is being diverted into these channels rather than slowly flowing across the road surface as sheet flow.

The resulting combination contains all the elements of an erosion problem: a greater volume of water travelling at a faster velocity in a smaller, more concentrated area. Add a steep slope and the erosion problem becomes severe.

The project engineer must design new ditches for stability and capacity and all good erosion control plans will detail how to protect these roadside ditches.

#### **4) Stabilize cut and fill slopes caused by construction activities.**

Normal construction activities will often involve areas where cuts are made into a slope or an embankment is formed of fill materials. Usually, structural stability on these slopes needs an engineer's expertise to prevent slumping and the failure of the slopes.

Sometimes groundwater seeps need to be controlled or a slope must be graded to a specific angle due to the soil's nature.

In terms of erosion control, slopes are very vulnerable areas. Damage usually occurs when runoff is allowed to flow unchecked down the cut/fill face of the slope. A two-pronged approach is often used to protect slopes from erosion: 1) water control measures and 2) slope surface cover.

Three water control measures can be used on a slope:

- Divert and disperse the water, away from the slope and to a stable area where infiltration can occur such as undisturbed forest floor.
- Convey the water down the slope in a reinforced channel or chute.
- Collect the water in a catch basin and pipe it to a stable outlet at the base of the slope.
- For surface cover on slopes, various combinations of vegetation and structural materials can be used:
  - On slopes 2:1 or flatter, vegetation alone may be used with special anchoring such as netting to hold mulch on newly seeded area.
  - Steeper slopes usually need special structural materials such as riprap, gabions, revetments or retaining walls.

#### **5) Install additional erosion control measures when working adjacent to environmentally sensitive areas**

In areas of vulnerable or irreplaceable resources, back-up protection for a primary erosion control measure should be provided. The following site and/or construction characteristics would require two levels of protection and a special upgraded erosion control plan:

- Construction or soil disturbance within the watershed of a pond or lake which is vulnerable to the addition of phosphorous. (Contact the DEP, Bureau of Land and Water Quality for a listing of phosphorous sensitive lakes and ponds in your area.)
- Construction or soil disturbance within 250 feet of a lake, pond, river, brook, or perennial stream.
- Construction or soil disturbance within 100 feet of an intermittent stream.
- Construction or soil disturbance within 100 feet of a wetland.
- Construction which requires crossing a stream (with a culvert, bridge, etc.).
- Construction of detention ponds or phosphorus ponds.
- Construction adjacent for crossing intermittent or perennial channels.
- Channel or slope construction on slopes greater than 8%.
- Channel or slope construction from September 15 to April 15, when no vegetation can grow.
- Moderate to highly erodible soils that will be exposed for longer than 1 month. (Information about the erodibility of a soil is available from the USDA Soil Conservation Service or the local Soil and Water Conservation District.)

#### **6) Install additional erosion control measures if the site must have bare soil exposed for an extended time period**

In certain unique situations, such as the operation of gravel pits, clay mining areas, certain lumber operations and golf course construction, it is not possible to sequence construction to minimize exposed soil. These sites which have to be left open for extended time period merit additional erosion control measures.

Prevent soil from getting into the water via mulching, temporary seeding, etc.

Provide ways of filtering, settling or diverting dirty water by installing measures described above in item #5.

## **7) Use special measures if working in or crossing streams**

The Maine DEP policy prohibits excavation and filling in streams because they are at risk for severe erosion. Plans that propose this kind of construction are often denied and planners and contractors should avoid proposing or conducting earthwork in waterways or water bodies.

Whenever a planned road crosses a flowing stream and a culvert needs to be installed, the process of installing that culvert will impact the stream. Fill material will be brought in. Heavy machinery will be driven back and forth in the stream channel. It is almost impossible to install a crossing without causing a discharge of sediment downstream. Installation of detention basins or phosphorous ponds in or near streams will have the same problems.

The impact of a road crossing a larger and wider body of water, such as a brook or river, is worse as more of the waterway embankment and channel will be disturbed for a longer time period and it is extremely difficult to filter out suspended sediment from large volumes of water travelling at high velocities.

If construction will be carried out in or adjacent to streams, a good erosion control plan should clearly identify these areas as vulnerable, and target special measures for them. Determine how sensitive the downstream watershed is, and adjust protective measures. For example, a shallow, well-vegetated wetland can handle sediment far better than a lake.

In every case the following "common sense" management techniques should be applied:

- Keep stream crossings to a minimum.
- Install culverts quickly and at times of low stream flow (late summer).
- Use only clean fill at crossings (without fines).
- Erect silt fencing along stream edges and down-slope from small fill areas.
- Stabilize disturbed soil areas within 7 days or prior to storm events, whichever occurs first.
- Cross the stream channel and associated buffer areas in the least possible distance (e.g. by crossing at a right angle to the stream).
- Minimize the amount of excavation, soil disturbance, and/or fill used in buffer areas adjacent to stream crossings.

Under most circumstances, downstream areas must be protected from sedimentation. In some cases, streams are diverted from their natural channel to protect the waterway from siltation during the installation of stream crossings. Sometimes a temporary stabilized channel or pipe system is provided and the stream diverted into it while construction takes place in the original streambed. Once the crossing is completed and revegetated, the stream is redirected to its original channel.

There are some situations where no permanent stream crossing is called for on the final design plan, but a temporary stream crossing is needed for heavy machinery to access the construction area. Provisions for a temporary crossing (usually a culvert surrounded by clean gravel) should be included as a temporary measure during construction. Temporary bridges may be an effective means to cross streams for short periods, and may result in less disturbance than temporary culverts.

## **8) Protect storm sewer inlets and culverts from sediment.**

All construction sites will experience some degree of erosion and dirty water will flow across them. During construction, try to keep this water away from new or existing catch basins and culverts and clean them out once the site is fully stabilized.

- Install filter barriers such as silt fencing and hay bales around catch basin inlets and small culverts.
- Protect larger culverts with stone check dams and sediment traps.
- In some cases, install a temporary perforated riser at a culvert for use only during the construction phase.

To function properly, temporary structures need regular inspection and maintenance. And when construction is over, they must be removed to avoid seriously obstructing or plugging the storm system. Also, since the long-term maintenance is usually transferred to the owner or the town once the stormwater system is accepted; they need to be informed of their responsibility to regularly inspect and clean these systems.

### **9) Avoid tracking mud into roadways.**

Sites located near urban areas are usually most sensitive to the problem of mud tracking. Each municipality should evaluate this issue and determine how significant it is to their area.

Efforts should be made to keep mud off public roads because:

- Some soils reduce road friction, which may lead to skidding and accidents.
- Mud eventually washes from the road into the road's ditches and stormwater systems, increasing clean out and maintenance costs.
- Mud (and dust when it dries) is considered a nuisance.

To prevent mud tracking:

- Install gravel entrances at the junction of the construction site and public roadways.
- Make provisions to wash truck tires before leaving the construction site.
- Sweep public roads.

### **10) Monitor the effectiveness of erosion control measures and, as needed, adjust, maintain and repair them.**

To protect natural resources on a site, include provisions for regular inspection and maintenance in every erosion control plan.

- Note how frequently inspections will occur (for example, once a week, before and after every storm event).
- Designate a responsible party to do the inspection and the follow-up adjustments, repairs and maintenance.
- The owner, town and municipality should be provided with some form of follow-up inspection procedures to determine if the erosion control plan is being followed. Actual field inspection by the town is the best way of getting a plan implemented at the site.

### **11) Remove temporary erosion and sedimentation measures.**

When construction activity has ceased and good healthy vegetation is growing on the site, the temporary erosion control items such as silt fencing, temporary diversions, stream crossings and perforated risers, need to be removed.

If left on the site, they can seriously block the normal function of the designed stormwater system. The erosion control plan must include an agreement and designate a party to remove these temporary measures.

### **12) Keep the plans, maps, details and documents simple.**

The field documents used by the contractor need to clearly identify what erosion control measures are to be used and where they will be located. The narrative should be easy to follow and placed directly on the plans. A statement may be included to identify that the erosion control plan is the minimum that the contractor must do. Given the site and weather conditions, additional measures may be required.

Details for erosion control measures should be included and all the dimensions for them noted.

The map submission should clearly identify where erosion control measures will be placed on the site.

Having the erosion control plan readily accessible to both the contractor and the code enforcement officer promotes the implementation of the plan!

On larger projects or in sensitive areas, meet with the contractor prior to beginning construction to review the erosion control measures and construction limitations for the project.

## ENVIRONMENTAL LAWS PERTAINING TO EROSION AND STORMWATER

### Erosion and Sediment Control Law (M.R.S.A. 420-C)

The Erosion and Sedimentation Control Law (Erosion Control Law) applies everywhere in all organized areas of the state, for all sizes of projects.

- For projects on or after July 1, 1997. If a person is filling, displacing or exposing soil or other earthen materials, the Erosion Control Law requires that he or she take measures to prevent unreasonable erosion of soil or sediment beyond the site or into a protected natural resource, such as a river, stream, brook, lake, pond, or wetland. Erosion control measures must be installed before the activity begins, be maintained, kept in place and functional until the site is permanently stabilized.
- For property with chronic erosion problem resulting from human activity undertaken before July 1, 1997. By July, 2005, property subject to erosion of soil or sediment into a protected natural resource, and located in the watershed of a body of water most at risk (as listed in Ch. 502 of DEP rules), must be properly stabilized to prevent further erosion. All other property subject to such erosion of soil or sediment into a protected natural resource must be stabilized by July 1, 2010.

### Natural Resources Protection Act-NRPA (38 M.R.S.A. 480 A-Z)

The NRPA was promulgated in 1988. It regulates activities in, on, over, and adjacent to lakes, ponds, river, streams, brooks, freshwater wetlands and tidal areas. Activities regulated under the NRPA include disturbing soil, placing fill, dredging, removing or displacing soil, sand or vegetation, draining or dewatering and building permanent structures, in, on, over or adjacent to these areas. The law is designed to protect these natural resources and is administered and enforced by the DEP.

*Note: The DEP does have authority to enforce these laws. Enforcement actions can consist of voluntary site restoration, filing for an after the fact permit, monetary penalties, consent agreements, or court action. Contact the DEP or your local Soil and Water Conservation District to find out more about these laws.*

### Maine Construction General Permit (W008157-5Y-A-N)

As of March 10, 2003, construction activities in Maine will require a Maine Construction General Permit (MCGP). The permit is based on the federal National Pollutant Discharge Elimination System (NPDES), a program that applies nationwide. The MCGP sets standards for managing stormwater that may pick up pollutants, including soils, and discharge them to waters of the states, such as lakes, streams and wetlands. The requirement for a MCGP is triggered by the amount of disturbed area created during construction. In contrast to Maine's existing Stormwater Law, the MCGP applies solely to construction activity and not to ongoing stormwater management following construction. The MCGP applies in both organized and unorganized areas of Maine. Certain activities, such as forest management and farming, are exempt from the MCGP. Landowner, contractor, or developer may need a MCGP if the construction will result in any of the following:

- One acre or more of disturbed area,
- A common plan of development located in an organized area that also requires a Stormwater Law or Site Location of Development law permit, or
- A common plan of development located in an unorganized area.

### Stormwater Management Law (38 M.R.S.A. 420-D)

The Stormwater Management law was enacted by the Maine Legislature in 1996 as a measure to begin to address the stormwater quantity and quality impacts of development in organized areas of the state. The law requires that a permit be obtained from the Department of Environmental Protection (DEP) prior to construction of a project that includes 20,000 square feet or more of impervious area in the direct watershed of a waterbody most at risk from new development. The

law also requires that in any watershed, a proposed project which includes 1 acre or more of impervious area or 5 acres or more of disturbed area (filled, grubbed, excavated, etc.) receive a permit. The law establishes a permitting process administered by the DEP. Proposed plans for stormwater management must be reviewed by the DEP before a new project is built. The review allows the DEP to determine whether the project will meet stormwater quantity and quality standards. Contact the DEP for additional information.

### **OTHER PERMITS**

Many construction activities will require local, state or federal permits prior to beginning construction. Be aware that construction in or adjacent to environmentally sensitive areas such as wetlands, streams and rivers, lakes and ponds generally require permits. Contact local, state and federal agencies to determine what regulations apply to your project.

**Wetlands:** Contact the US Army Corps of Engineers for information about federal permits regarding dredging, filling or building in or near wetlands. Contact the Department of Environmental Protection (DEP) for state permits for wetlands alteration. In unorganized areas of Maine contact the Land Use Regulation Commission (LURC) for these permits.

**Lakes and Ponds:** Contact the DEP for state permits for construction in or adjacent to ponds and lakes. In unorganized areas of Maine, contact LURC for these permits. Contact your local Code Enforcement Officer for information about shoreland zoning laws that may apply in these areas.

**Rivers and Streams:** Contact the US Army Corps of Engineers for information about federal permits on navigable waters. Contact the DEP for state permits for construction in or adjacent to streams (intermittent and perennial) and rivers. In unorganized areas contact LURC for these permits. Contact your local Code Enforcement Officer for information about shoreland zoning laws that may apply in these areas.